

## CHAPTER 3

# PROJECT MANAGEMENT

Successful project management is the result of a proactive project manager and a dynamic project team.

### WHY PROJECT MANAGEMENT

Project management provides the tools and techniques necessary for DOTD to effectively utilize its human and financial resources in all of its activities. Project management:

- Establishes target objectives
- Provides for accountability
- Increases productivity
- Minimizes cost overruns
- Streamlines processes
- Minimizes bureaucracy.



The consequences of the lack of effective project management are many:

- Project failure – delivery targets are not met, costs are overrun
- Lack of accountability
- Lots of finger pointing
- Completed projects do not meet expectations.

### SPECIFIC ROLES OF THE PROJECT MANAGER

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The Project Manager is responsible for seeing that activities on assigned projects are completed in a timely manner and within budget. This involves close coordination with Project Team members representing the various Sections. While the Project Manager does not have direct authority over these team members, he or she has the right and responsibility to request the allocation of resources required to accomplish the necessary tasks on time and within budget. The decision over what resources are provided rests with the various DOTD Sections from which the team members are assigned. However, the affected Section Heads have the responsibility to provide

the necessary resources, or advise the Project Manager and their superiors that the resources are not available. Once assigned to a Project Team, the individual team member is responsible for completing his or her assigned task in the timeframe designated by the Project Manager.

For some projects, such as those covered by Categorical Exclusions (CE) or Environmental Exclusions (EE), the Project Team may consist of only the Project Manager in addition to one or two other members. Complex projects, such as capacity improvements, major bridge projects, corridor upgrades, or new infrastructure projects, may require a much larger Project Team. In general, these projects require an Environmental Impact Statement (EIS) or an Environmental Assessment (EA).

The Project Manager serves four basic roles in the development of a project. The degree of effort required for each role varies with the size and complexity of the project. Projects covered by CEs or EEs may require minimal effort in one or more of these roles, while major projects could require considerable effort. The Project Manager must determine the appropriate amount of effort required for each role to insure the successful completion of the project. The four basic roles are:

- Planning
- Team Building
- Directing
- Controlling

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Effective planning avoids unnecessary crises and anticipates unavoidable crises, making them easier to control. Generally, the more complex the project, the more time should be spent planning it.

## PLANNING

The purpose of a Project Plan is to divide the overall project requirements into elements that can be effectively managed. Effective planning avoids unnecessary crises and anticipates unavoidable crises, making them easier to control.

Generally, the more complex the project, the more time should be spent planning it. This is because of the difficulty in realizing loosely defined objectives that extend over long periods of time. The major purpose of planning is to divide broad project objectives into manageable tasks that can be performed in relatively short time periods.

The Project Plan usually consists of the following sections:

### ***Work Breakdown Structure***

The Work Breakdown Structure (WBS) identifies “**what must be done?**” and involves determining the project requirements. The framework for the WBS can often be developed from the Purpose and Need Statement and other supporting documents developed in the Stage 0.

A good WBS is simple and summarizes the scope of services in a brief and simple manner, using the minimum number of tasks and subtasks necessary to describe the work to be done.

A good WBS consists of a summary of the scope of services required. Because it is the foundation of any system of project control, the Project Manager should devote considerable attention to preparing the WBS.

Keep the WBS simple. A good WBS summarizes the scope of services in a brief and simple manner, using the minimum number of tasks and subtasks necessary to describe the work to be done. An excessively detailed WBS invariably leads to a loss of control because



Project Managers do not have the time required to track numerous minor activities and to continuously update a complex task outline, schedule and budget. For project control purposes, it is better to establish a simple WBS that can be easily tracked and updated than a complex one, which is tedious and time consuming to maintain.

To be included in the WBS, a task should contain the following definable elements:

- Scope of activity or activities
- Duration or durations (i.e. schedule)
- Level of effort required (i.e. budget).

If all of the above elements cannot be defined then the task does not belong in the WBS.

When preparing a WBS, use the same task breakdown structure consistently through each of the project activities of 1) scope of activities, 2) schedule, and 3) budget. This consistency allows project progress to be monitored accurately because each activity in the scope of services can be measured in terms of progress made, time elapsed, and money spent. Using consistent activity definitions also permits assessment of project impacts due to changes to the scope of services.



## Example Work Breakdown Structure

### **PHASE I – SCOPING & PURPOSE AND NEED**

1. SOLICITATION OF VIEWS AND SCOPING
  - 1.1 Solicitation of Views
  - 1.2 MPO Pre -Scoping
  - 1.3 Scoping
2. PURPOSE AND NEED

### **PHASE II – ALTERNATIVES STUDY**

3. CORRIDOR STUDIES
  - 3.1 GIS Environmental Inventory
    - 3.1.1 Environmental Features
      - Wetlands
      - Scenic Streams
      - Cultural Resources
      - Recreational & Community Facilities
  - 3.2 Corridor Development
  - 3.3 Public Outreach and Agency Review
  - 3.4 Corridor Recommendation
4. SURVEYING AND MAPPING
5. ALIGNMENT STUDIES
  - 5.1 Constraint Mapping and GIS
  - 5.2 Preliminary Alignment Engineering
  - 5.3 Environmental Field Studies
6. ALIGNMENT REVIEW
  - 6.1 DOTD and Agency Field Reviews
  - 6.2 Public Outreach
  - 6.3 Action Plan
7. ALIGNMENT REVISIONS
8. LANDOWNER ACCESS AND CENTERLINE FLAGGING

### **PHASE III – ENVIRONMENTAL DOCUMENTATION**

9. DRAFT EIS
  - 9.1 Summary
  - 9.2 Purpose and Need
  - 9.3 Alternatives
  - 9.4 Affected Environment
  - 9.5 Environmental Consequences
  - 9.6 Public Hearings
10. TECHNICAL REPORTS
11. PHASE I ARCHAEOLOGY AND GEOARCHAEOLOGICAL STUDY
12. FINAL EIS AND ROD

## Schedule

Develop a schedule based on the WBS that includes major project milestones. The schedule illustrates “**when is it to be done?**”. The schedule must be developed with consideration of the availability and timing of project financial resources.

Regardless of the scheduling system or the project, there are a number of attributes that are found in every good schedule.

- It's easily communicated – the Project Team has to understand what the schedule is all about. In general, schedules that are in a graphic format are most easily communicated.
- It's flexible – schedules change. That is a fact of project life.
- It has the commitment of the Project Team – every team member has to agree with the task and time constraints
- It shows task interrelationships – most tasks rely on information or results from a previous or simultaneous task. Schedules must show these interrelationships.
- It is prepared in calendar days, not workdays
- It forces early deadlines – scheduling tasks to be completed as soon as possible leaves some float to clean up loose ends.
- It allows for change time following reviews – changes following reviews are inevitable.

The Critical Path Method (CPM) of project scheduling calculates the total duration of a project based on individual task durations and their dependencies.

CPM considers many factors when setting a task's start and finish dates (e.g. constraints set on the dates, dependencies on other tasks,

The Critical Path Method (CPM) of project scheduling calculates the total duration of a project based on individual task durations and their dependencies.



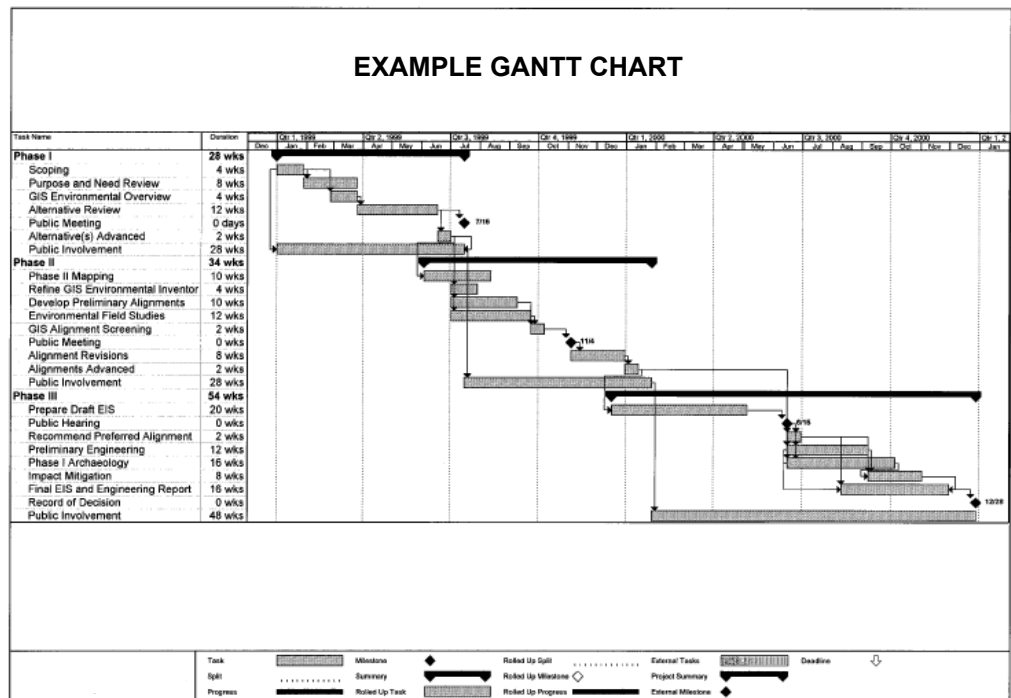
Project schedule can be effectively and visually demonstrated through the use of a Gantt, PERT, or Milestone Chart. Each shows that task duration is crucial to the overall project schedule.

task's duration). Task duration is crucial. The project's finish date is determined by the latest finish dates of all tasks. Those finish dates are affected by how long the interrelated tasks take to complete. The CPM schedule can be viewed in a number of ways.

A Gantt Chart displays task information as both text and bar graphics and can be customized to make the Gantt Chart view more effective. These are sometimes also referred to as a Bar Chart. On the left side of the chart are typically fields where task names, durations, start and finish dates, and other information can be entered or modified. On the right side, Gantt bars graphically display task durations and start and finish dates on a timescale. The relative position of the Gantt bars shows the sequence in which project tasks are scheduled to occur.

A Gantt Chart view is useful for:

- Entering tasks and task durations
- Establishing sequential relationships between tasks, which illustrates that changing a task duration affects the start and finish dates of other tasks and the project finish date
- Assign personnel and other resources to tasks
- Track progress by comparing scheduled dates with the actual start and finish dates and by checking the percentage of each task that is complete



Every project is unique, and so are their schedules. Examples of EA and EIS Gantt Charts consistent with the requirements of DOTD's Program and Project Management System (PPMS) are located in the Appendix.

A Program Evaluation and Review Techniques (PERT) Chart displays tasks and task dependencies as a network diagram or flowchart. Boxes, or nodes represent tasks, and lines that connect the boxes represent task dependencies. PERT Chart views can also be customized to make the view more effective.

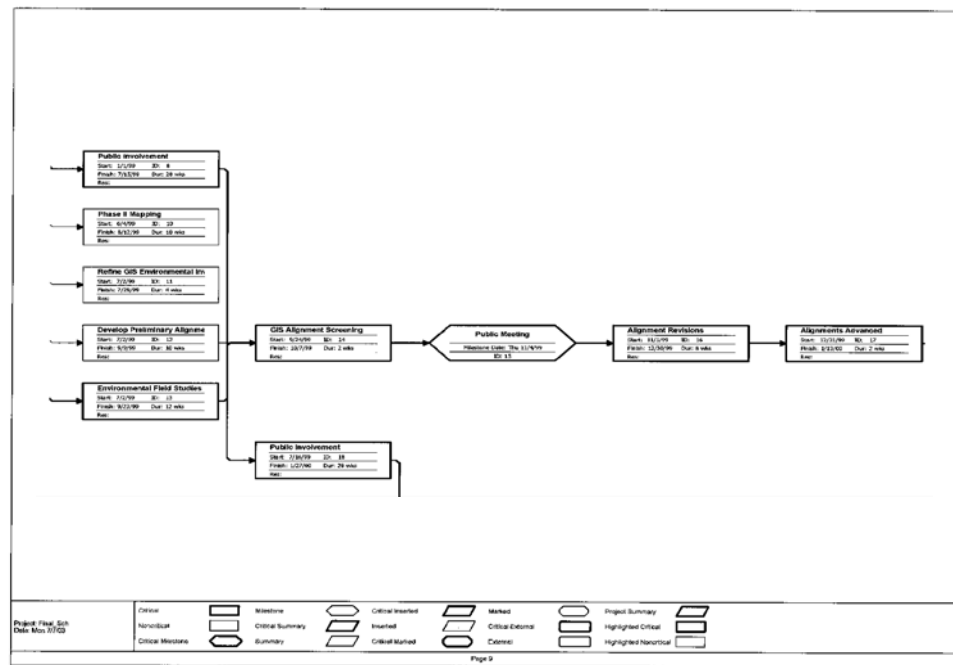
A PERT Chart view is useful for:

- Fine-tuning the schedule in a flowchart format
- Editing task information in the PERT boxes
- Linking tasks to specify the task sequence and to determine start and finish dates.

Examples of EA and EIS PERT Charts consistent with the requirements of DOTD's Program and Project Management System (PPMS) are located in the Appendix.

A Milestone Chart identifying target completion dates for specific tasks or activities can be readily developed from the CPM project schedule.

### Example PERT Chart



### Example Milestone Chart

Task Name	Duration	Start	Finish
<b>Phase I</b>	28 wks	1/1/1999	7/15/1999
Scoping	4 wks	1/1/1999	1/28/1999
Purpose and Need Review	8 wks	1/29/1999	3/25/1999
GIS Environmental Overview	4 wks	2/26/1999	3/25/1999
Alternative Review	12 wks	3/26/1999	6/17/1999
Public Meeting	0 days	7/15/1999	7/15/1999
Alternative(s) Advanced	2 wks	6/18/1999	7/1/1999
Public Involvement	28 wks	1/1/1999	7/15/1999
<b>Phase II</b>	34 wks	6/4/1999	1/27/2000
Phase II Mapping	10 wks	6/4/1999	8/12/1999
Refine GIS Environmental Inventory	4 wks	7/2/1999	7/29/1999
Develop Preliminary Alignments	10 wks	7/2/1999	9/9/1999
Environmental Field Studies	12 wks	7/2/1999	9/23/1999
GIS Alignment Screening	2 wks	9/24/1999	10/7/1999
Public Meeting	0 wks	11/4/1999	11/4/1999
Alignment Revisions	8 wks	11/5/1999	12/30/1999
Alignments Advanced	2 wks	12/31/1999	1/13/2000
Public Involvement	28 wks	7/16/1999	1/27/2000
<b>Phase III</b>	54 wks	12/17/1999	12/28/2000
Prepare Draft EIS	20 wks	12/17/1999	5/4/2000
Public Hearing	0 wks	6/15/2000	6/15/2000
Recommend Preferred Alignment	2 wks	6/16/2000	6/29/2000
Preliminary Engineering	12 wks	6/16/2000	9/7/2000
Phase I Archaeology	16 wks	6/16/2000	10/5/2000
Impact Mitigation	8 wks	9/8/2000	11/2/2000
Final EIS and Engineering Report	16 wks	8/11/2000	11/30/2000
Record of Decision	0 wks	12/28/2000	12/28/2000
Public Involvement	48 wks	1/28/2000	12/28/2000

### Budget and Funding Sources

Identify sources, amounts, and availability timing of funds required for Stage 1 project development. This identifies “**how much it will cost and what are the funding sources?**”.

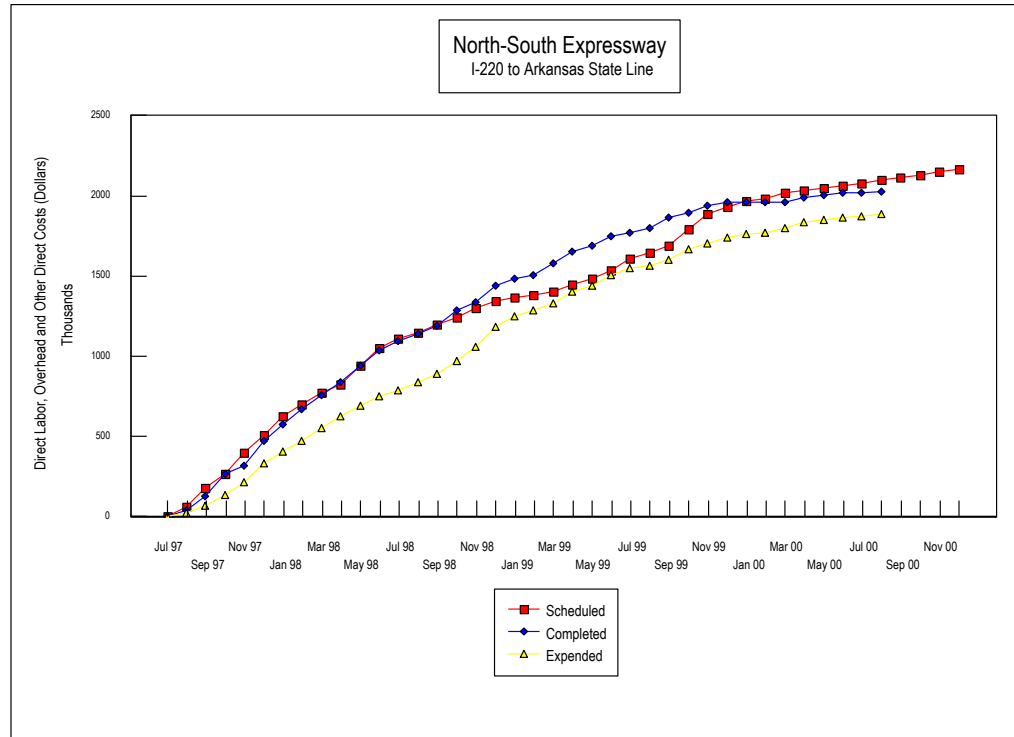
Once the project budget has been completed, the next step is to develop a projected expenditure curve that serves as the basis for projecting resource requirements and monitoring budget and schedule status throughout the project. Apportioning each task budget into the scheduled time frame for the corresponding activity derives the expenditure projection. Values can then be totaled for each reporting period and summed to estimate the cumulative expenditures throughout the project that can be plotted to form a curve.

A projected expenditure curve serves as the basis for projecting resources requirements and monitoring budget and schedule status throughout the project.



This curve is sometimes referred to as an S-Curve, and represents not only the projected expenditures, but also the estimated rate of project progress. The S-Curve can serve as the baseline against which the status of the project can be measured.

### Example S-Curve



### Organization

Develop an organization chart for the project; review project position descriptions and outline duties, responsibilities and restrictions for each project position; and coordinate efforts with Section Administrators to identify and select possible project team members. Periodically review the project organization and institute changes to the organizational structure and personnel, if necessary.

### ***Responsibility Matrix***

Develop a matrix of responsibilities, by task, for potential team members with specialized expertise. At this point the matrix will not include specific team member's name; however, it will include required specialized talents such as road design engineer, real estate, geotechnical engineer, district project engineer, etc.

### ***Staffing Plan***

Develop a preliminary list of manpower requirements and staffing source for the duration of project. The staffing plan identifies “**who is going to do it?**” and involves determining staff level requirements for each task, the duration of engagement for each team member, and where each team member is going to come from. Predict when and for how long each team member will be needed. DOTD's Program and Project Management System (PPMS) can be an effective planning tool during this activity.

- Providing Phone Numbers, E-Mail and Physical Addresses of Project Team Members and Key Stakeholders
- Reviewing project position descriptions and outline duties, responsibilities and restrictions for project team members
- Coordinating efforts with the line managers in identifying and selecting members of the project team
- Periodically reviewing project organization and institute changes to the organizational structure and personnel, if necessary.

### Example Task Responsibilities Matrix

Task	Planning / Scoping	Environment	Design	Traffic Engr.	Real Est. / Utilities	District
<b>PHASE I: SCOPING / PURPOSE AND NEED</b>						
Prepare Notice of Intent (NOI) (EIS only)		✓				
Define Study Area	☆	✓	▼			▼
Prepare Public Involvement Plan	☆	✓				☆
Prepare Solicitation of Views (SOV)		✓	▼	☆		
Identify Stakeholders	☆	✓	☆			☆
Conduct Scoping Meetings	☆	✓	☆	☆		☆
Develop Preliminary Purpose and Need Statement	✓	☆	▼	☆		▼
Identify Preliminary Environmental Issues	☆	✓				☆
Refine Final Purpose and Need Statement	▼	✓	▼	☆		▼
<b>PHASE II: ALTERNATIVES STUDY</b>						
Obtain Project Mapping	☆	✓	☆			
Develop Environmental Inventory	☆	✓	☆			
Develop Preliminary Alternatives	☆	▼	✓	☆	▼	▼
Perform Preliminary Alternatives Analysis & Screening	☆	✓	▼	▼		
Conduct Public/Agency Involvement Meetings	☆	✓	☆			☆
Refine Alternatives	▼	▼	✓	☆	▼	▼
Identify Preferred Alternative	▼	✓	▼			▼
<b>PHASE III: DOCUMENTATION</b>						
Prepare Draft Environmental Document	▼	✓	▼	☆	☆	☆
Distribute Draft Environmental Document	☆	✓				
Conduct Public Hearing (mandatory for EIS; if requested for EA)	☆	✓	☆		☆	☆
Prepare Technical Reports	▼	✓				
Address Comments	☆	✓	☆	☆	☆	☆
Identify Selected Alternative	▼	✓	▼			▼
Prepare Final Environmental Document	▼	✓	▼	☆	☆	☆
Coordinate Project Budget with Project Finance Committee	▼	✓	▼			▼
Secure Environmental Closure		✓				
Prepare Scope and Budget Memorandum		✓	✓			
		✓ – Primary		☆ – Support		▼ – Review



***Contractual Agreements***

Review all authority, permits, agreements, and financial and other contractual agreements affecting the project's success. Make provisions for updating and adhering to all terms and requirements of these agreements.

***Pitfalls***

Identify all potential problem areas and make provisions to address them if and when they occur. Simply anticipate problem areas; make a list and plan to meet them head-on.

***Project Team Member Performance Measures***

State how a team member's performance will be evaluated and reported to the Section Administrator for inclusion in the team member's annual performance review. Identify a set of objective criteria to be used in the evaluation. These criteria should meet Administration approval.

***Possible Rewards***

Identify any special reward that may be available to the project team. Identify the source amounts, and the special criteria for selection of the candidate recipient.

**TEAM BUILDING**

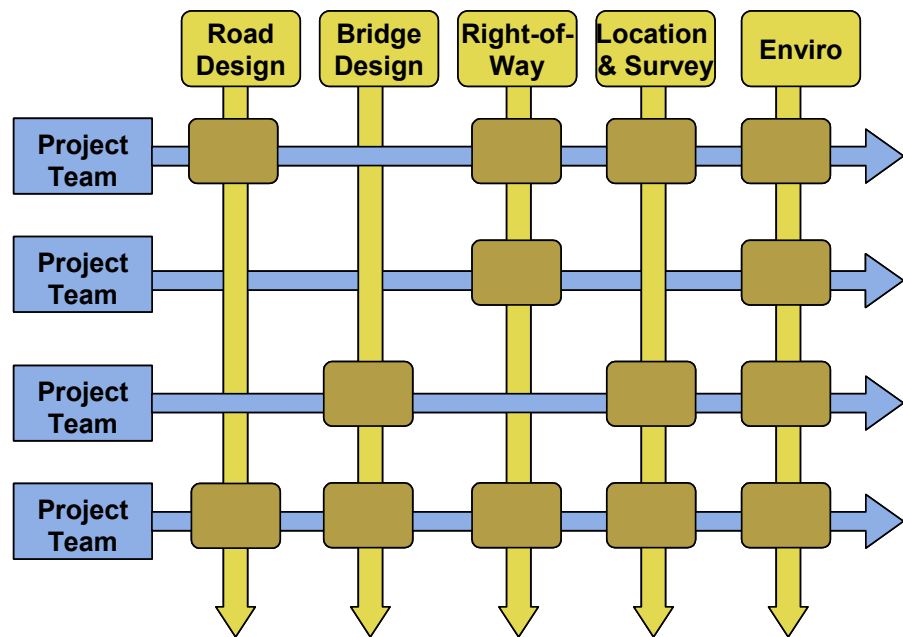
Team building is the process of finding the right person to perform a specific task in a competent manner. Team members can come from within the DOTD or from external sources such as consulting firms. If a consulting firm's services are utilized, the entire staff of that firm can be considered as potential team members.



The Staffing Plan developed as part of the Project Plan should be used during the negotiation process with the various Section Administrators for the desired Stage 1 staff.

Depending on the complexity of the project, the project team can be staffed with team members for many technical disciplines. The Project Manager is responsible for coordinating and integrating activities across the Project Team and, as such, must be generally familiar with the operations of each technical discipline.

### PROJECT TEAMS



### DIRECTING

Directing is the process of guiding each activity to its timely completion within its given budget. This deals with “**who is doing what?**” and is basically one of effective communication, making sure that project work is done efficiently and that nothing falls through the cracks.



Directing requires an appropriate organizational structure and staff that is familiar with the project, is knowledgeable about the technical issues, and has a dedication to the successful completion of the project. Directing includes the following:

- Direct all activities related to project management function – plan to meet all contractual obligations
- Develop a strategy for team operation – establish written guidelines and clearly define responsibilities and restraints
- Develop and implement decision process within the project team – ensure that decision authorities are well understood by the team members
- Establish performance goals for the project and members of the project team
- Promote the growth and professional development of the project team members
- Foster and develop a spirit of project team effort
- Take an active role in conflict resolution between departments or groups
- Maintain current knowledge of overall project status
- Maintain effective communications with all partners, team members, and others performing project work.

Project control is monitoring the project activities for compliance with DOTD general policies, mission, and philosophy while maintaining personal control of adherence to contract requirements.

## CONTROLLING

Control is the process for monitoring the actual project progress, the evaluation of the progress to ensure that the project objectives are being met, and in the case of deviation, taking corrective actions to put the project back on track. The Control process ensures that the project



“is being done” in accordance with the approved schedule and budget. Controlling includes:

- Monitor project activities for compliance with DOTD general policies, mission, and philosophy
- Interpret, communicate, and require compliance with project procedures, contracts, the approved plan, and directives
- Maintain personal control of adherence to contract requirements
- Ensure adherence to time and cost schedules – take necessary steps to meet milestone targets
- Closely monitor project activities for conformity to project scope provisions
- Take corrective actions to put the project back on track when there is deviation from the schedule or budget.

### ***Project Cost Control***

Another role of the Project Manager is project cost control. The Project Manager is the individual who is most familiar with the project. Having this in-depth knowledge assures that job costs are properly accounted and that invoices are paid promptly.